

ABSTRACT

A two step method for solid state polymerization of dry crystalline thermoplastic polymers to form polymers with superior mechanical properties, first by mechanically fluidizing dry crystalline thermoplastic polymer particles in the absence of oxygen by means of blades moving through the fluidized polymer particles at velocities sufficient to heat the particles to an incipient melt temperature and maintain the temperature until solid state polymerization provides the desired molecular weight and before chemical degradation of the polymer occurs; and second by immediately quenching by application of liquefied cryogenic gases directly to the surfaces of the polymer particles in amounts sufficient to cool the particles to temperatures lower than the glass transition temperature of the polymer before crystals in the polymer aggregate into large spherulites.